CLAIMS

1. A polymer foam comprising a plurality of cells defined by cell walls which constitute a polymer matrix,

said polymer matrix being comprised of:

5 to 100 parts by weight, relative to 100 parts by weight of the total of components (A) and (B), of (A) a hydrogenated copolymer obtained by hydrogenating an unhydrogenated copolymer comprising vinyl aromatic monomer units and conjugated diene monomer units, said unhydrogenated copolymer containing at least one copolymer block S comprised of vinyl aromatic monomer units and conjugated diene monomer units, and

95 to 0 part by weight, relative to 100 parts by weight of the total of components (A) and (B), of (B) at least one polymer selected from the group consisting of an olefin polymer other than said hydrogenated copolymer (A) and a rubbery polymer other than said hydrogenated copolymer (A),

said hydrogenated copolymer (A) having the following characteristics (1) and (2):

(1) said hydrogenated copolymer (A) has a content of said vinyl aromatic monomer units of from more than 40 % by weight to 60 % by weight, based on the weight of said hydrogenated copolymer (A), and

(2) at least one peak of loss tangent (tanδ) is observed at -40 °C to lower than -10 °C in a dynamic viscoelastic spectrum obtained with respect to said hydrogenated copolymer (A),

said polymer foam having a specific gravity of from 0.05 to 0.5.

2. The polymer foam according to claim 1, wherein the amounts of said hydrogenated copolymer (A) and said polymer (B) are, respectively, 5 to 95 parts by weight and 95 to 5 parts by weight, relative to 100 parts by weight of the total of components (A) and (B).

3. The polymer foam according to claim 1 or 2, wherein substantially no crystallization peak ascribed to at least one hydrogenated copolymer block obtained by hydrogenating said at least one copolymer block S is observed at -50 to 100 °C in a differential scanning calorimetry (DSC) chart obtained with respect to said hydrogenated copolymer (A).

4. The polymer foam according to any one of claims 1 to 3, wherein at least one of said at least one copolymer block S in said unhydrogenated copolymer has a structure wherein said vinyl aromatic monomer units are

distributed in a tapered configuration.

5. The polymer foam according to any one of claims 1 to 4, wherein said unhydrogenated copolymer further contains a homopolymer block H of vinyl aromatic monomer units, the amount of said homopolymer block H in said unhydrogenated copolymer being in the range of from 1 to 40 % by weight, based on the weight of said unhydrogenated copolymer.

6. The polymer foam according to any one of claims 1 to 3, wherein said unhydrogenated copolymer is at least one polymer selected from the group consisting of copolymers which are, respectively, represented by the following formulae:

(1) S,

(2) S-H,

(3) S-H-S,

(4) $(S-H)_m-X$,

(5) $(S-H)_n-X-(H)_p$,

(6) H-S-H,

(7) S-E,

(8) H-S-E,

(9) E-S-H-S,

(10) $(E-S-H)_m-X$ and

(11) $(E\text{-}S\text{-}E)_m\text{-}X$,

wherein each S independently represents a copolymer block comprised of vinyl aromatic monomer units and conjugated diene monomer units, each H independently represents a homopolymer block of vinyl aromatic monomer units, each E independently represents a homopolymer block of conjugated diene monomer units, each X independently represents a residue of a coupling agent, each m independently represents an integer of 2 or more, and each of n and p independently represents an integer of 1 or more.

7. The polymer foam according to any one of claims 1 to 6, wherein said hydrogenated copolymer (A) has bonded thereto a modifier having a functional group.

8. The polymer foam according to claim 7, wherein said modifier is a first-order modifier having at least one functional group selected from the group consisting of a hydroxyl group, an epoxy group, an amino group, a silanol group and an alkoxysilane group.

9. The polymer foam according to claim 7, wherein said modifier comprises a first-order modifier and, bonded thereto, a second-order modifier,

wherein said first-order modifier has at least one functional group selected from the group consisting of a hydroxyl group, an epoxy group, an amino group, a silanol group and an alkoxysilane group, and

wherein said second-order modifier has at least one functional group selected from the group consisting of a hydroxyl group, a carboxyl group, an acid anhydride group, an isocyanate group, an epoxy group and an alkoxysilane group.

10. The polymer foam according to any one of claims 1 to 9, wherein said olefin polymer as component (B) is at least one ethylene polymer selected from the group consisting of a polyethylene, an ethylene/propylene copolymer, an ethylene/propylene/butylene copolymer, an ethylene/butylene copolymer, an ethylene/hexene copolymer, an ethylene/octene copolymer, an ethylene/vinyl acetate copolymer, an ethylene/acrylic ester copolymer and an ethylene/methacrylic ester copolymer.

11. The polymer foam according to any one of claims 1 to 9, wherein said rubbery polymer as component (B) is

at least one member selected from the group consisting of a 1,2-polybutadiene, a hydrogenation product of a conjugated diene homopolymer, a copolymer comprised of vinyl aromatic monomer units and conjugated diene monomer units and a hydrogenation product thereof, a block copolymer comprised of a homopolymer block of vinyl aromatic monomer units and at least one polymer block selected from the group consisting of a homopolymer block of conjugated diene monomer units and a copolymer block comprised of vinyl aromatic monomer units and conjugated diene monomer units and a hydrogenation product thereof, an acrylonitrile/butadiene rubber and a hydrogenation product thereof, an ethylene/propylene/diene rubber (EPDM), a butyl rubber and a natural rubber.

12. The polymer foam according to claim 11, wherein said rubbery polymer as component (B) is at least one member selected from the group consisting of a hydrogenation product of a copolymer comprised of vinyl aromatic monomer units and conjugated diene monomer units, said hydrogenation product having a vinyl aromatic monomer unit content of from more than 60 % by weight to 90 % by weight, based on the weight of said hydrogenation product; and a block copolymer comprised of a

homopolymer block of vinyl aromatic monomer units and at least one polymer block selected from the group consisting of a homopolymer block of conjugated diene monomer units and a copolymer block comprised of vinyl aromatic monomer units and conjugated diene monomer units and a hydrogenation product thereof.

13. The polymer foam according to any one of claims 1 to 12, which exhibits an impact resilience of 40 % or less.

14. The polymer foam according to any one of claims 1 to 13, which has a specific gravity of from 0.1 to 0.3.

15. The polymer foam according to any one of claims 1 to 14, which is a shock absorber.